Virtual AI Nurses and the Future of Chronic Disease Management

By David Lee

David Lee, partner at Simon-Kucher & Partners, sits down for a fireside chat with serial entrepreneur Julia Hu to talk about virtual AI nurses and the future of chronic disease management. Hu founded Lark Health in 2011 with the goal of scaling personalized, digitally driven health care to anyone in the world.

JULIA HU

Julia Hu, founder of **Lark Technologies**, has become something of an expert on the digital health environment and the role of prevention in the US health system, having worked with large tech players such as **Apple, Amazon, Google** and **Samsung**. She shares her insights into future trends and opportunities in this space

Lark's *AI nurse* is the first non-human technology to fully replace a live health care professional and be fully reimbursable with a CPT code. It is managing the equivalent caseload of 20,833 full time health care professionals. Lark works with health plans and providers to provide infinitely scalable health care.

Having managed her own chronic disease throughout her life, Hu felt the benefits of 24/7 compassionate care. Together with health experts and coaches from Stanford, Harvard and artificial intelligence technologists, she developed Lark – a 24/7 personal AI nurse that texts with people to help them manage and prevent chronic disease. Prior to founding Lark, Hu ran global incubator Clean Tech Open, a green buildings startup, and was an entrepreneur in residence at Stanford's StartX. Hu has also advised former US president Barack Obama, is a faculty member at Singularity University, and is on the board of the Council of Diabetes Prevention.

David Lee: When did you know that you wanted to be a health entrepreneur?

Julia Hu: I loved entrepreneurship ever since I discovered it when I was at Stanford. After starting two companies in cleantech, I jumped right into health care because of my own health issues. I've had a chronic disease all my life. It wasn't diagnosed until I was in my 20s. My chronic condition was a pervasive part of my life as a kid. My dad looked for professionals and after 30 failed attempts with specialists, we ended up finding nutritionists. There were weekly meetings for over 12 years, which got rid of 95% of my attacks. I completely changed my diet and how I managed my medication and exercise. It was a transformative experience. I was lucky to have this 24/7 personal health team helping me manage my chronic condition, but unfortunately most people don't have access to this type of health care. I really wanted to see if we could scale this personalized compassionate health care to anyone in the world, especially those at high risk of or suffering from chronic conditions. So, that's what started Lark, and we have been working at it for almost seven years. Today we work with major health plans and have close to two million members on our platform.

Lark has a clear focus in diabetes and hypertension. Could you speak about the focus around chronic disease and some of the market related choices you've made?

Our health care system is very good at addressing infectious diseases but structurally unable to fully support long term chronic conditions. That's why we're seeing that 86% of all health care costs are in chronic conditions. Our goal is to reduce that burden and cost, and that is why we focus on the most burdensome diseases of our generation – diabetes, prediabetes, hypertension, etc. We also work very closely with a lot of Harvard and Stanford behavior change experts and therapists to help people manage depression, and the emotional baggage that is a common comorbidity of these chronic conditions, with cognitive behavioral therapy. We focus on chronic conditions because it's all about long term engagement and self-efficacy. There are a lot of behavioral and lifestyle changes that impact how you feel every day.

You mention the emphasis on making a meaningful impact for patients and we have read a lot about how you have worked to make your AI "compassionate". What role do you think that has played in the success Lark has had, and what are your thoughts on how that can be brought more broadly into digital health, because there are so many solutions out there that leave people feeling cold?

It's a huge part of our philosophy. When I was a kid I felt very alone. I couldn't play on sports teams like my friends could. It felt unfair that I would have random attacks at night. I sometimes felt frustrated and a bit scared, but I felt like so much of the love and support given to me made it feel fine to live with a chronic condition. We really think that the key to chronic conditions – even more than medical advice, which you might get from a doctor, such as "Lose some weight, exercise more, take your pills" – is truly a behavioral health and behavior change problem. So, if you can get to the heart of the problem, you can easily transform the situation.

In my mind, it is a bit ironic, but I think that the AI nurse is the only way to send the love and care of a nurse or doctor to everyone in the world in a manner that is unlimited and 24/7. I think that only an AI would be able to not provide judgment when you're telling them about how hard it is to. It's about using the benefits and strengths of technology to show that we are seeing your efforts and that we are coaching you and training you to be better. We try to make sure that all the coaching is personalized. We would never tell a marathon runner to go and try to do 10,000 steps today nor would we ask a very obese diabetic to go run 2 miles if they never run. Really, it has to be personalized based on the continuous data that we are getting from all sorts of sources – from your phone, from the 75 health monitors that we link up with and directly get data from, from the blood pressure monitor to genetics data that we are pulling in. We are trying to create a behavioral model of each person, and then seeing their efforts and then coaching them to become better.

A virtual AI nurse is a bit of a radical concept. How do you work with the existing health care system and clinicians? What are some of the obstacles you've encountered and how have you overcome them?

Obviously, no one is going to disrupt the health care system in the ways that maybe less regulated and less complex industries have been disrupted. So, we really try to stay within the workflows of the health care system. For example, our diabetes prevention program is CDC recognized. It is fully medically reimbursed as a program that anyone can use if they have the correct insurance companies. We went through the steps for CDC Full Recognition, of getting our own NPI number to be a provider, and to be medically reimbursable. We worked with a team of about 16 Harvard and Stanford faculty members who helped us translate the latest gold standard of care. As an example, we translated the American Diabetes Association guidelines into the coaching protocols for type 2 diabetes management and hypertension management. And we worked with the chief medical officer of the Joslin Diabetes Center, which is the largest diabetes center in the world run by Harvard, to make sure our AI Diabetes Care services focused on the key issues. We really try to make sure that the program both conforms to the latest gold standard of care but also is delivered in a way that is in conjunction with the health plans that we work with. For example, a nurse at a call center can in one minute onboard a patient with our AI nurse.

One of the things that came up fairly early for your company development was the decision to migrate from a device and software company to being a software-only company. Could you share a bit of your thinking around that and how this decision has shaped your approach going forward?

It was a difficult decision because we had achieved a couple million dollars in revenue, and the hardware and software business was really growing at that time as an industry. So, this was a personal decision. We felt like we wanted to be an AI coach, an AI nurse, on top of all devices – not just our own. We wanted to share that signal very strongly with the market to make sure that other hardware companies did not feel that we were competitive in any way. Because we wanted to be the layer on top of all this data. We made the difficult decision to step back from hardware, and undergo about another three years of R&D to try to link up to multiple devices. That's why today we sit on top of 95% of the smart phones and sensors, we sit on top of 75% of health monitors, we sit on top of genetic data, and so forth.

To me, startups can't do multiple things at once. We chose the AI coaching piece to focus on. We changed early in our company's existence, within the first year. So, most of our life we've been in the world of software-only, but I think we also have a good sense of hardware and how to connect with sensors to pull data from them in an effective and efficient way so that we get real time behavioral models on every one of our 1.5 million patients.

You mention that decision to be the application layer on top of the data. When we talk about digital health, we inevitably come back to tech companies like Apple, Google, Amazon and Samsung and their ambitions in health care. Would you share some of your thoughts on partnering with large players? What are your key lessons learned?

We've had some exciting opportunities to work with many of those players closely. Health care is so complex and fragmented from a regulatory standpoint. The companies that can figure out how to localize and aggregate all of the health care and consumer health data into

one unified data repository will unlock a lot of potential in health care. Claims data is great, and we should absolutely integrate that into one place, but a person's life generates so much more consumer health data – where they go for meals, what pills they're taking from their local pharmacy, how much exercise they do, what their daily glucose level is – all of that information. If someone has the ability to aggregate it into one place then I think there will be a lot of value. Apple's Health Kit and consumer centric data approach is interesting. You're also seeing that successful consumer-centric approach with Amazon and their recent acquisition of PillPack – which is a delightful consumer-centric pharmacy experience.

I am excited about some of the consolidations that are happening in the tech and health tech space. Certainly, we believe that understanding a person's context enables more personalized health care services. If you can gain the trust and engagement of a patient, they will share more information about themselves. That is a positive feedback loop and it is the basis of Lark's AI engine. Our AI nurse has improved by close to 40% just within one year of launching our fully medically reimbursed DPP (diabetes prevention program). Now, within a year we are the second largest DPP program in the country. All of that data is really helping the AI nurse get smarter.

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>
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The CMS Innovation Center has named DPPs as one of two pilot programs to reduce cost, improve quality and outcomes. What do you think is primarily responsible for that? What about the program design or protocol makes it so effective?

It's great that our health care system is looking at prevention so seriously now. DPP is the first fully medically reimbursed program that focuses on prevention and not chronic disease management, and we're excited to be one of the fastest growing and second largest CDC-recognized diabetes prevention provider in the country. Prevention can be done so much more cheaply than management of a chronic condition. If you can prevent someone from being a type 2 diabetic that is $8,000 to $20,000 of cost per year for the rest of their life that is averted. The program is relatively inexpensive to distribute and serve. In my mind, if we can continue to focus on the root of the problem, which is helping people before they are suffering from chronic conditions, everyone wins.

The FDA just published a new strategic framework about the use of real-world data and real-world evidence in drug and biologics development. What role do you see for Lark as a partner to pharma and biotech companies as a source of patient recorded outcome tool, and real-world evidence generation?

There is a lot of benefit to society from this. Pharma and biotech companies can create much more impactful products by using data from larger populations than was previously available through clinical trials. You're seeing 23andMe doing a lot of great work in sharing their huge databases to move science forward.

Currently, we are focused on helping major health insurance providers and self-insured employers manage their chronic patient population or wellness population. However, our mission is to offer free 24/7 chronic condition care services to all members everywhere, so who knows where that will lead.

You recently announced a collaboration with 23andMe for the integration of genetic insights into new weight loss and diabetes prevention programs. Can you share some of your thoughts on the partnership and the role of genetics in Lark's development going forward?

23andMe and Lark created a new genetics based chronic disease management platform together and we think it's a breakthrough for personalized medicine. By taking 23andMe's incredible insights about genetic variants and the impacts of genetics on certain lifestyle interventions, Lark is able to provide even more personalized real-time interventions for chronic patients or those at high risk of chronic conditions. We're so happy 23andMe chose Lark among all the larger potential partners in its efforts to create actionable meaning from genetics.

Let's now pivot to some of the challenges of running a high growth company. You mentioned earlier it's hard for startups to do more than one thing well. How do you balance doing that one thing well and keeping focused on the mission, but also leaving room for experimentation for new concepts that you are inevitably presented with?

Doing one thing well, in our case providing infinitely scalable compassionate chronic care for all, actually necessitates a lot of experimentation. We act more like a consumer product company in that respect. We do a lot of user testing and experimentation on which features are best, which recruitment philosophies are best. On the other hand, where we try to be very disciplined is to not chase after shiny projects that are not our core competency. We've been lucky enough to be regarded as one of the creators of the AI chatbot modality and get a lot of interest from chief information officers in other industries working on chatbots. We just see that as very flattering but something that we cannot proceed with at this moment. It's more looking at your mission and your goals and seeing if you are the best person for the job and if it's aligned. It's always hard but we try to stay focused in chronic disease, in areas where there is self-efficacy involved, in areas where there is passive data involved. We are focused on a pipeline of new chronic diseases, where we think our technology is good for solving those problems.

When you think about the marketplace, what are the biggest threats to your business? Is it more about changing the consumer mindset or fending off larger companies who are trying to co-opt some of your capabilities?

Neither of those really keep me up at night. Text messaging is mass market – we don't need to train the consumer here. My 85-year-old aunt is better at texting in WeChat than I am. Alexa and Siri have proven that people feel comfortable with having conversations with AI. The problem for startups like us is competing against much more well-funded and larger companies who market similarly. We are spending time building a clinical portfolio with rigor that conservative health plans and other health care players are comfortable with. We're lucky because scaling to their millions of members is not an issue – it's more the brand awareness and long sales cycle that keep me up at night.

Based on what you see in the marketplace today, what parts of consumer health engagement do you think are most ready for further disruption? What do you see as key white spaces and opportunities?

I still feel like chronic disease management is a huge play for technology, especially building on top of Internet of Things and the vast data that society is generating. The recent Propeller Health exit is a great example of an IoT connected device plus app service.

Other key white spaces I'm excited by are genomics and mental health. The next step of genomics is to field action rather than just be a cool study about yourself, while mental health startups are focusing on real-time need. I'm very excited that digital health has continued to be a hot early-stage venture bet even though you're not seeing as much of the immediate unicorn deals. Health care in general has a much longer life cycle, but huge value is created in those areas.

As an entrepreneur, is there anything that you would be looking for from the government in terms of standards or interoperability that you think would accelerate the achievement of your mission?

I'm not a policy expert by any means, and I was not very involved in policy until I realized that changes in policy have huge ramifications. So, I joined a couple of boards to advocate for policies and leadership – Council for Diabetes Prevention and the Silicon Valley Leadership Group. The reimbursement of the CDC recognized diabetes prevention program was a huge step in the right direction. I think it would be incredible to have CPT codes that start addressing diabetes and hypertension and other chronic conditions. There are some great advances in telemedicine codes. I think that if these codes can be extended to AI and digital counseling, that would drive real scale.

Looking at international expansion and other markets, have you given much thought to potentially extending Lark's reach to other markets?

My idealistic dream is to provide anyone in the world suffering from or at risk for a chronic condition personal compassionate health care. It doesn't matter if they are 500 miles away from a hospital or a good clinic, or can't afford care. We have architected our systems so that we can internationalize. We've been approached by a lot of partners and have been having great conversations with large health plan partners that are able to help us navigate the complex regulatory environment and business environment.

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About the Author

David Lee leads the global sales practice within Simon-Kucher's life sciences activities. His focus is on helping medical technology and pharmaceutical clients drive organic growth by advising on monetization strategy, sales force optimization, key account negotiation, and commercial excellence programs. He is also a member of Simon-Kucher's global medical technology practice, advising health care IT, digital health, diagnostics and medical device and equipment clients on sales, marketing and pricing initiatives.

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